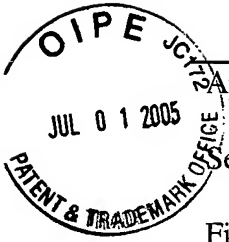


7-05-05

IFW

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE



Applicant(s): JARDINE, Peter A.

Dated: July 1, 2005

Serial No.: 10/734,812

Group Art Unit: 1775

Filing Date: 12/11/2003

Examiner: John Zimmerman

Title: SHAPE MEMORY DEVICE  
HAVING TWO-WAY  
CYLINDRICAL SHAPE MEMORY  
EFFECT DUE TO  
COMPOSITIONAL GRADIENT  
AND METHOD OF  
MANUFACTURE

Attorney Docket No.: P042877-06UT

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**INFORMATION DISCLOSURE STATEMENT**

Dear Sir:

This Information Disclosure Statement is submitted herewith:

☐ under 37 CFR 1.97(b), or  
(Within three months of filing national application; or date of entry of international application; or before mailing date of first office action on the merits; whichever occurs last)

☒ under 37 CFR 1.97(c) together with either a:  
☐ Certification under 37 CFR 1.97(e), or  
☒ a \$240.00 fee under 37 CFR 1.17(p), or  
(After the CFR 1.97(b) time period, but before final action or notice of allowance, whichever occurs first)

☐ under 37 CFR 1.97(d) together with a:  
☐ Certification under 37 CFR 1.97(e), and  
☐ a petition under 37 CFR 1.97(d)(2)(ii), and  
☐ a \$130.00 petition fee set forth in 37 CFR 1.17(i)(1).  
(Filed after final action or notice of allowance, whichever occurs first, but before payment of the issue fee)

**Certification Under 37 C.F.R. §1.97(e)**

(Check one)

- ☐ Applicant(s) hereby certify that each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement;
- ☐ Applicant(s) hereby certify that no item of information contained in the present information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing this certification after making reasonably inquiry, no item of information contained in the present information disclosure statement was known to any individual designated in 1.56(c) more than three months prior to the filing of the information disclosure statement.

**PTO Form 1449**

☒ Applicant(s) submit herewith Form PTO 1449-Information Disclosure Citation together with copies, of non-U.S. patents, all publications or other information of which applicant(s) are aware, which applicant(s) believe(s) may be material to the examination of this application and for which there may be a duty to disclose in accordance with 37 CFR 1.56.

**Additional Comments**

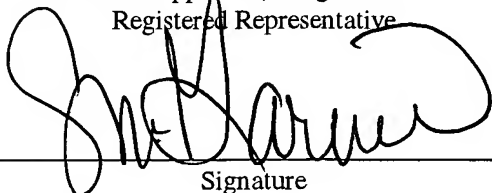
The relevance of the attached references is that this is the closest art of which Applicant is aware. Applicant submits that the above references taken alone or in combination neither anticipate nor render obvious the present invention. Consideration of the foregoing in relation to this application is respectfully requested.

It is requested that the information disclosed herein be made of record in this application.

I hereby certify that this correspondence is being deposited with the United States Postal Service by Express Mail (Label No. EV 736947237 US) in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on July 1 2005

Cyndy McGarvie

Name of applicant, assignee or  
Registered Representative



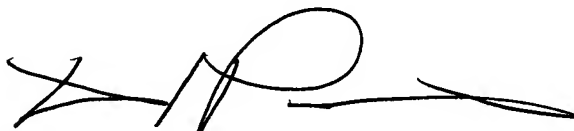
Signature

July 1, 2005

Date of Signature

JSP:kat  
Enclosure

Respectfully submitted,



Christopher J. Paradies

Registration No.: 45,692

FOWLER WHITE BOGGS BANKER P.A.

501 East Kennedy Blvd., Suite 1700

Tampa, Florida 33602

Telephone: (813) 222-1129



Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Substitute for form 1449A/PTO

**INFORMATION DISCLOSURE  
STATEMENT BY APPLICANT**

(Use as many sheets as necessary)

**Complete if Known**

Application Number	10/734,812
Filing Date	12-11-2003
First Named Inventor	JARDINE, PETER A.
Art Unit	1775
Examiner Name	John J. Zimmerman
Attorney Docket Number	P042877-PLUT

Sheet

1

of

5

**U.S. PATENT DOCUMENTS**

Examiner Initials*	Cite No. <sup>1</sup>	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number - Kind Code <sup>2</sup> (if known)			
		US-4,864,824	09-12-1989	GABRIEL ET AL.	
		US-5,061,914	10-29-1991	BUSCH ET AL.	
		US-5,325,880	07-05-1994	JOHNSON ET AL.	
		US-5,080,455	01-14-1992	KING ET AL.	
		US-5,836,066	11-17-1998	INGRAM	
		US-6,001,195	12-14-1999	KAJWARA ET AL.	
		US-6,358,380	03-19-2002	MANN ET AL.	
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			

**FOREIGN PATENT DOCUMENTS**

Examiner Initials*	Cite No. <sup>1</sup>	Foreign Patent Document	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T <sup>6</sup>
		Country Code <sup>3</sup> - Number <sup>4</sup> - Kind Code <sup>5</sup> (if known)				
		59-116342	07-1984			
		60-83753	05-1985			
		63-166940	07-1988			

Examiner  
SignatureDate  
Considered

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. <sup>1</sup>Applicant's unique citation designation number (optional). <sup>2</sup>See Kinds Codes of USPTO Patent Documents at [www.uspto.gov](http://www.uspto.gov) or MPEP 901.04. <sup>3</sup>Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>4</sup>For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>5</sup>Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. <sup>6</sup>Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Substitute for form 1449B/PTO  <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>  (Use as many sheets as necessary)			<b>Complete if Known</b>		
			Application Number	10/734,812	
			Filing Date	12-11-2003	
			First Named Inventor	JARDINE, PETER A.	
			Art Unit	1775	
			Examiner Name	John J. Zimmerman	
Sheet	2	of	5	Attorney Docket Number	P042877-016 UT

NON PATENT LITERATURE DOCUMENTS		
Examiner Initials*	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
		J.A.WALKER ET AL "Thin-film Processing of TiNi Shape Memory Alloy" Sensors and Actuators, vols. A21-A23, p. 243-246, 1990. (No Month)
		J.D. BUSCH et al., "Shape-memory properties in Ni-Ti Sputter Deposited Film", J. Appl. Phys., vol 68 (12), pp. 6224-6228, Dec. 15, 1990.
		K. KURIBAYASHI, et al., "Micron sized arm using reversible TiNi alloy tin film actuators" Mat. Res. Soc. Symp. Proc., vol 276, pp. 167-175, 1992 (No Month).
		J.D. BUSCH et al., "Phase transformations in sputtered Ni-Ti film: effects of heat treatment and precipitates", Mat. Res. Soc. Symp. Proc., vol 230, pp. 91-97, 1992 (No month)
		D.S. GRUMMON, et al., "Thermottractive titanium-nickel thin films for microelectromechanical systems and active composites", Mat. Res. Soc. Symp. Proc., vol 459, pp. 331-342, 1997 (No Month)
		Q. SU, et al. "Martensitic transformation in Ni <sub>50</sub> Ti <sub>50</sub> films" J. of Alloys and Compound, vol. 211/212, pp. 460-463, 1994 (No month)
		S. MIYAZAKI et al., Shape memory characteristics of sputter-deposited Ti-Ni base thin films", SPIE, vol. 2441, pp. 156-164, 1995 (No Month).
		A. ISHIDA, et al., "Shape memory behavior of Ti-Ni thin films annealed at various temperatures", Mat. Res. Soc. Symp. Proc., vol 360, pp. 381-386, 1995 (Month)
		C.A. RAY, et al. "A Silicon-based shape memory alloy microvalve", Mat. Res. Soc. Symp. Proc., vol 276, pp. 161-166 (1992). (No Month).
		W.L. BERNARD, et al. "Thin film shape memory alloy actuated micropumps", J. of Microelectromechanical Systems, vol. 7, No. 2, pp. 245-251, Jun. 1998
		K. KURABAYASHI, et al., "Trial fabrication of micron sized arm using reversible TiNi alloy thin film actuators", Proceedings of the 1993 IEEE/RSJ International Conf. on Intel. Robots and Sys., Yokohama, Japan, pp. 1697-1702, Jul 26-30, 1993

Examiner Signature	Date Considered
--------------------	-----------------

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Applicant's unique citation designation number (optional). \*Applicant is to place a check mark here if English language Translation is attached. This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Substitute for form 1449B/PTO  <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>  (Use as many sheets as necessary)				<b>Complete if Known</b>	
				Application Number	10/734,812
				Filing Date	12-11-2003
				First Named Inventor	JARDINE, PETER
				Art Unit	1775
				Examiner Name	JOHN ZIMMERMAN
Sheet	3	of	5	Attorney Docket Number	P042877-06 UT

NON PATENT LITERATURE DOCUMENTS		
Examiner Initials*	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
		S. MIYAZAKI, et al. "Effect of heat treatment on deformation behavior associated with R-phase and martensitic transformations in Ti-Ni thin films" Trans. Mat. Res. Soc. Jpn., vol. 18B, pp. 1041-1044, 1994 (No Month)
		A. ISHIDA, et al., "Effect of heat treatment on shape memory behavior of Ti-rich Ti-Ni thin films", Materials Transactions, JIM, vol. 36, No. 11, pp. 1349-1355, 1995 (No Month).
		A. PETER JARDINE, "Deposition parameters for sputter-deposited thin film TiNi", Mat. Res. Soc. Symp. Proc., vol. 360, pp. 293-298, 1995 (No Month).
		T.W. DEURIG, et al. Engineering Aspects of Shape Memory Alloys, pp. 3-46, 1990 (No month).
		S. MIYAZAKI, et al., "Development of perfect shape memory effect in sputter-deposited Ti-Ni films", Proceedings IEEE Mico Electro Mechanical Systems, pp. 176-181, 1994 (No Month).
		R.H. WOLF, et al. "TiNi (Shape Memory) Films on Silicon for MEMS Applications". J. of Microelectromechanical Systems, vol. 4, No. 4, pp.206-212, Dec. 1995.
		A. GYOBU, et al., "Martensitic transformation in sputter-deposited shape memory Ti-Ni films", Mat. Trans. JIM vol. 37, No. 4, pp. 697-702, Apr. 1996.
		P. KRULEVITCH et al., "Thin film shape memory alloy micro-actuators", J. of Microelectromechanical Systems, vol. 5, No. 4, pp. 270-282, Dec. 1996.
		J. FAVALUKIS, et al., "An Expirementally Validated Thermal Model of Thin Film NiTi", Proceedings of SPIE, vol. 3668, Part Two, pp. 617-629, Mar. 1-4, 1999.
		C.M. Ho, et al., "Mems: Science and Technology," Application of Microfabrication to Fluid Mechanics, FED V. 197, ASME 1994, pp. 39-49, 1994. (No Month).
		L.G. Carpenter: Vacuum Technology an Introduction, Adam Hilger Ltd., Bristol 2 <sup>nd</sup> Edition, (1983), pp. 76-82. (No Month)

Examiner Signature	Date Considered
--------------------	-----------------

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup>Applicant's unique citation designation number (optional). <sup>2</sup>Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Substitute for form 1449B/PTO  <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>  (Use as many sheets as necessary)		<b>Complete if Known</b>			
		Application Number	10/734,812		
		Filing Date	12-11-2003		
		First Named Inventor	JARDINE, PETER		
		Art Unit	1775		
		Examiner Name	JOHN ZIMMERMAN		
Sheet	4	of	5	Attorney Docket Number	P042877-66 UT

NON PATENT LITERATURE DOCUMENTS		
Examiner Initials*	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
		Q.SU, et al., "Martensitic transformation in Ni50Ti50 films", SPIE vol. 2189, pp. 409-412 (1994). (No month)
		V.S. CHERNYSH, et al., "Angular distributions of Ni and Ti atoms sputtered from a NiTi alloy under He+ and Ar+ ion bombardment," Nuclear Inst. and Methods in Physics Research B 140, pp. 303-310 (1998) (No month).
		I. NESHEV, et al., "Sputtering of NiTi alloys: a comparison of experiment and simulation", Vacuum vol. 44, Nos. 3-4, pp. 209-212 (1993). (No Month).
		Ken K. Hol, et al., "Modeling and measuring the response of times of thin film TiNi", SPIE Proceedings Smart Mat. Tech., vol. 3040, San Diego, CA, Mar. 3-4 1997, pp. 10-22.
		E. QUANDT, et al., Sensors and Actuators A53 (1995) Sputter Deposition of TiNi and TiNiPd Films Displaying the Two Way Shape Memory Effect.
		BENDAHAN MARC, et al., "NiTi shape memory alloy thin films; composition control using optical emission spectroscopy", Thin Solid Films 283 (Sep. 1996), pp. 61-66
		KRULEVITCH, P. et al., "Mixed-sputter deposition of Ni-Ti-Cu shape memory films", Thin Solid Films 274 (Mar. 1996), pp. 101-105
		MIYAZAKI, S., et al., "Martensitic transformations in sputter-deposited Ti-Ni-Cu shape memory alloy thin films", Thin Solid Films 281-282 (Aug. 1996) pp. 354-367
		CHEN, J.Z., "Crystallization behavior of r.f.-sputtered TiNi thin films" Thin Solid Films 339 (Feb. 1999) pp. 194-199.
		HO, KEN et al., "Sputter depositions of NiTi thin film exhibiting the SME at room temperatures", Proceedings of the Symposium, 1998 ASME International Mechanical Engineering Congress and Exposition, Nashville, TN, Nov. 14-19, 1999.
		GABRY, B., et al., "Thermodynamic modeling of the recovery strains of sputter-deposited shape memory alloys Ti-Ni and Ti-Ni-Cu thin films", Thin Solid Films 372 (Sep. 2000), pp. 118-133

Examiner Signature	Date Considered
--------------------	-----------------

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.  
 \*Applicant's unique citation designation number (optional). \*Applicant is to place a check mark here if English language Translation is attached.  
 This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Substitute for form 1449B/PTO  <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>  (Use as many sheets as necessary)		<b>Complete if Known</b>			
		Application Number	10/734,812		
		Filing Date	12-11-2003		
		First Named Inventor	JARDINE, PETER		
		Art Unit	1775		
		Examiner Name	JOHN ZIMMERMAN		
Sheet	5	of	4	Attorney Docket Number	P042877-06 UT

NON PATENT LITERATURE DOCUMENTS		
Examiner Initials*	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
		HO, KEN K. et al., "Sputter deposition of NiTi thin film shape memory alloy using a heated target", Thin Solid Films 370 (Jul. 2000), pp. 18-29
		SURBLED, P., et al., "Shape memory alloys for micromembranes actuation", LIMMS/CNRS-IIS, Institute of Industrial Science, University of Tokyo 7-22-1 Roppongi, Minato-ku, Tokyo 106-8558, Japan 7 pages (no date).
		KEN K. HO, JOHN J. GILL and Gregory P. Carman, "Sputter deposited NiTi thin film SMA for active flow control", 11 pages (no date).
		GILL, J. et al., "Three Dimensional Thin Film Shape Memory Microactuator with Inherent Two-Way Actuation," J. of Microelectromechanical Systems, Feb. 2002, V11 # 1, pp. 68-78
		GILL, J.J., et al., "Manufacturing Issues of Thin Film NiTi Microwrapper", Sensors and Actuators, Physical, 93(2), (2001), pp. 148-156

Examiner Signature	Date Considered
--------------------	-----------------

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup>Applicant's unique citation designation number (optional). <sup>2</sup>Applicant is to place a check mark here if English language Translation is attached. This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*